

Application No. 09/142,464

I. RESPONSE TO RESTRICTION REQUIREMENT

As discussed in the May 16, 2001 personal interview, claims 8-13 and 21-26 have been withdrawn from consideration due to the restriction requirement issued in the parent application.

In Response to the Restriction Requirement dated November 10, 1999, Applicant elected group I, claims 1-7 and 14-20. This election was made with traverse.

Because the Restriction Requirement was not made final, Applicant again submits that claims 1, 3-14 and 16-26 do not lack unity of invention because they recite common special technical features. The Examiner's attention is again directed to MPEP page A1-36, Annex B, Part 1, which indicates the following:

Unity of invention exists only when there is a technical relationship among the claimed inventions involving one or more of the same of corresponding special technical features. The expression "special technical features" is defined in Rule 13.2 as meaning those technical features that define a contribution which each of the inventions, considered as a whole, makes over the prior art... The method for determining unit of invention under Rule 13 shall be construed as permitting,... in addition to an independent claims for a given product, and an independent claimed for a process specially adapted for the manufacture of the product... Thus, a process shall be considered to be specially adapted for the manufacture of a product if the claimed process inherently results in the claimed product with the technical relationship being present between the claimed product and claimed process. The words "specially adapted" are not intended to imply that the product could not also be manufactured by a different process. (Emphasis added)

Applicant submits that there is a special technical relationship present between the product of claims 1, 3-7, 14, and 16-20, and the process of claims 8-13 and 21-26, and that

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the method of claims 8-13 and 21-26 is specially adapted for the manufacture of the product of claims 1, 3-7, 14 and 16-20.

In particular, claims 1 and 11 claim a piezoelectric resonator comprising leads being provided with a flat leading end portion which opens in a substantially U-shaped edge which opens toward a leading end of the leads, connected substantially in parallel with an electrode, using a connecting layer formed with a conductive resin between the flat leading end portion and the electrode, the piezoelectric resonator element being supported by the leads so that a gap is formed between the supporting member and the piezoelectric resonator element. Claims 8 and 21 claim a method for manufacturing a piezoelectric resonator comprising providing a gap between the supporting member and the piezoelectric resonator element, and forming a connecting layer of a conductive resin between the electrode and flat leading end portions of the leads, connected substantially in parallel with the electrode, and having a substantially U-shaped edge which opens toward a leading end thereof.

Additionally, the Examiner's attention is directed to 37 C.F.R. §1.475(b)(1) which reads as follows: "An international or national stage application containing claims to different categories of invention will be considered to have unity of invention if the claims are drawn only to one of the following combinations or categories: (1) a product and a process specially adapted for the manufacture of said product."

Accordingly, Applicant submits that the restriction requirement of claims 1, 3-7, 14 and 16-20, and claims 8-13 and 21-26 is improper. Applicant requests substantive consideration of all of claims 1, 3-7, 8-14 and 16-26.

II. THE CLAIMS SATISFY ALL 35 U.S.C. §112, FIRST PARAGRAPH REQUIREMENTS

The Office Action rejects claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §112, first paragraph, as containing subject matter which is not described in the specification in such a

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way as to reasonably convey to one skilled in a relevant art that the inventor, at the time the application was filed, had possession of the claimed invention. Specifically, the Office Action asserts that there is no description or illustration in the original disclosure of a structure where the piezoelectric resonator is attached to an end of the U-shaped opening and/or "attached on the side facing the support elements". Claims 1, 8, 14 and 21 have been amended to remove the feature which required attaching the piezoelectric resonator to an end of the U-shaped opening. Additionally, claims 1, 8, 14 and 21 have been amended to eliminate the feature requiring the piezoelectric resonator to face the supporting member. These claims now claim a side of the piezoelectric resonator element which faces the leads, may be positioned on the substantially U-shaped edge. Thus, to eliminate the feature requiring the piezoelectric resonator to face the supporting member.

III. THE CLAIMS SATISFY ALL 35 U.S.C. §112,
SECOND PARAGRAPH REQUIREMENTS

The Office Action rejects claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Office Action asserts that these claims are vague and indefinite, inaccurate or incomplete. Additionally, the Office Action asserts that claim 1 only claims a single electrode which does not appear to be attached to the piezoelectric element but only opposed to one surface of the piezoelectric resonator element. Claims 1, 8, 14 and 21 have been amended to claim more than one electrode disposed on the piezoelectric body, thus obviating the above-mentioned 112 rejection.

The Office Action also asserts that claim 1 does not provide proper antecedent basis for "side" of the piezoelectric element or what constitutes an "end" of the U-shaped opening. Claims 1, 8, 14 and 21 have also been amended to eliminate the "end" feature of the U-shaped

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opening. Claims 1, 8, 14 and 21 each recite "a side" of said piezoelectric element. Applicant submits that the piezoelectric resonator element inherently has sides so that this recitation does not constitute a lack of proper antecedent basis.

The Office Action also rejects claims 4-6 and 17-19 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Office Action asserts that these claims are vague and indefinite and that it is unclear whether or not a fixing layer is included in the completed finished device claimed. Applicant would like to direct Examiner's attention to Figs. 6b and 7. Fig. 7 is an enlarged view of the connecting portion connecting the piezoelectric resonator element to the lead, using a connecting layer 32 formed there between. Additionally, Fig. 7 shows temporary fixing layer 34 disposed between the piezoelectric element and the lead. Fig. 6b shows the final step of the invention with reinforcing layer 33 covering both the connecting layer 32 and the temporary fixing layer 34. Consequently, temporary fixing layer 34 is part of the completed device as claimed.

IV. THE CLAIMS DEFINE ALLOWABLE SUBJECT MATTER

The Office Action mailed on January 18, 2001 rejects claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §102(a) as being clearly anticipated by Nakata et al. (Figs. 2, 8, 9, 16, 30, 34, 43 and 45) or Japan (821) (Fig. 4). This rejection is respectfully traversed.

Nakata et al. does not teach each of the leads being provided with a flat leading end portion having a substantially U-shaped edge which opens toward a leading end of the leads, wherein each flat leading end portion is connected substantially in parallel with an electrode, disposed on the piezoelectric body, using a connecting layer formed with a conductive resin between the flat leading end portion and the electrode, wherein the piezoelectric resonator

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element is attached to the substantially U-shaped edge on a side of the piezoelectric resonator element which faces the leads, as claimed in claim 1.

Instead, Nakata et al. teaches, in Fig. 8, lead-in conductors 7 having an arcuate projection 201 bonded on a side to a quartz plate 8 by an insulating adhesive or sealing material or the like.

Because Nakata et al. does not disclose these features, it cannot provide the advantages of claimed invention. Additionally, it is not obvious to modify Nakata et al. to make up for these deficiencies. For example, the claimed U-shaped edge which opens toward a leading edge of leads connected substantially in parallel with an electrode using a connecting layer formed as a conducting resin between the flat leading end portion and the electrode, allows attachment of the piezoelectric resonator element in a soft manner to the supporting member, thus allowing remarkable improvement of impact resistance against, for example, dropping.

Thus, if it was obvious to modify Nakata et al. to make up for this deficiency, then one of ordinary skill in the art would have done so to achieve the above advantages. However, the Examiner has not identified such a reference.

Japanese Patent No. 3-107821 does not teach leads being provided with a flat leading end portion having a substantially U-shaped edge which opens towards the leading end of the leads wherein each flat leading end portion is connected substantially in parallel with an electrode, disposed on the piezoelectric body, using a connecting layer formed with a conductive resin between the flat leading end portion and the electrode, as claimed in claim 1.

Instead, Japanese Patent No. 3-107821 discloses soldering an element to the lead of a support member.

Because Japanese Patent No. 3-107821 does not disclose these features, it cannot provide the advantages of the claimed invention. Additionally, it is not obvious to modify

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Japanese Patent No. 3-107821 to make up for this deficiency. For example, the claimed connecting layer formed with a conductive resin between the flat leading end portion and the electrode does not subject the piezoelectric body to local heating as in soldering, so there is no influence on the piezoelectric body itself. Therefore, the piezoelectric resonator element mounted through the steps of the invention involves almost no risk of occurrence of distortion and temperature characteristics, thus permitting provision of a piezoelectric resonator unit having a very high accuracy.

Thus, if it was obvious to modify Japanese Patent No. 3-107821 to make up for this deficiency, then one of ordinary skill in the art would have done so to achieve the above advantages. However, the Examiner has yet to find such a reference.

The Office Action mailed on January 18, 2001 also rejects claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent No. 6-303077 in view of Scott Jr. et al. (U.S. Patent No. 3,849,681), German Patent No. DT 26 12 643 A1, or Ogiso et al. (U.S. Patent No. 5,867,074). These rejections are respectfully traversed.

The Office Action admits that Japanese Patent No. 6-303077 does not teach a gap between the piezoelectric element and the support member, as claimed in claims 1, 8, 14 and 21. However, the Office Action asserts that Scott Jr. et al., German Patent No. DT 26 12 643 A1 or Ogiso et al. make up for this deficiency. This rejection is respectfully traversed.

Japanese Patent No. 6-303077 discloses leads being provided with a flat leading end portion having a substantially U-shaped edge opening toward a leading end of the leads, wherein each flat leading end portion is connected substantially and parallel with an electrode using a connecting layer between the leading end portion and the electrode. However, Japanese Patent No. 6-03077 does not provide motivation to place the piezoelectric element so that the flat leading end portions are perpendicular to the piezoelectric resonator element.

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German Patent No. DT 26 12 643 A1 discloses a piezoelectric element seated within a U-shaped opening so that the piezoelectric element is perpendicular to the U-shaped opening and not parallel to the U-shaped opening. Consequently, German Patent No. DT 26 12 643 A1 does not suggest or provide motivation for modifying the piezoelectric device of Japanese Patent 6-303077 which results in the claimed invention.

Scott Jr. et al. discloses in col. 6, lines 5-20, and Fig. 2, bifurcations on each terminal preferably spaced apart a distance slightly greater than the thickness of the thickest crystal plate expected to be supported by the terminals so that a crystal may be readily slipped into place between the bifurcation. Scott et al. also teaches placing the element perpendicular to the U-shaped opening. Consequently, Scott Jr. Et al. does not suggest or provide motivation for modifying the electric resonator element of Japanese Patent No. 6-303077 to result in the claimed invention.

This application has a United States filing date of September 9, 1998 and claims foreign priority from Japanese Patent No. 9-4162 having a filing date of January 13, 1997. Ogiso et al. qualifies as prior art against this application under 35 U.S.C. §102(e). Ogiso et al. and this application are both assigned to the Seiko Epson Corporation. Consequently, Ogiso et al. cannot be considered prior art against the present invention under 37 C.F.R. §1.104(c)(iv) and 35 U.S.C. §103(c).

Therefore, for all the foregoing reasons, it is submitted that claims 1, 8, 14 and 21 are allowable. For at least the same reasons, it is respectfully submitted that claims 3-7, 9-13, 16-20, and 22-26 depending therefrom, are similarly allowable.

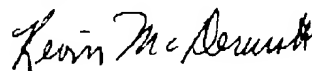
V. CONCLUSION

In view of the foregoing amendments and remarks, Applicant submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 3-14 and 16-26 are earnestly solicited.

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Should the Examiner believe that anything further would be desirable in order to place the application in condition for allowance, the Examiner is invited to contact Applicant's undersigned Attorney at the telephone number listed below.

Respectfully submitted,



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JAO:KXM/fpw

Attachment:
Appendix

Date: May 22, 2001

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DEPOSIT ACCOUNT USE AUTHORIZATION Please grant any extension necessary for entry; Charge any fee due to our Deposit Account No. 15-0461
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APPENDIX

Changes to Claims:

The following is a marked-up version of the amended claims:

1. (Five Times Amended) A piezoelectric resonator, comprising:
a piezoelectric resonator element having a piezoelectric body and ~~an electrode~~
electrodes disposed formed on a surface of the piezoelectric body;
a supporting member supporting said piezoelectric resonator element; and
a plurality of leads mechanically connecting said piezoelectric resonator
element to said supporting member and permitting electrical connection thereof, each of said
leads being provided with a flat leading end portion having a substantially U-shaped edge
which opens toward a leading end of the leads, each flat leading end portion being connected
substantially in parallel with ~~said an electrode, said electrode opposing one surface of said~~
~~piezoelectric resonator element, and using a connecting layer being formed with a conductive~~
resin between the flat leading end portion and said electrode, and
said piezoelectric resonator element being attached to ~~said leads at an end of~~
~~the leading end portion on a portion of the substantially U-shaped edge closest to said~~
~~piezoelectric resonator element,~~ on a side of said piezoelectric resonator element which faces
~~said supporting member leads,~~ so that an edge of said piezoelectric resonator element on the
side which faces said ~~supporting member leads~~ may be positioned on ~~said portion of the~~
substantially U-shaped edge and that the piezoelectric resonator element is supported by said
leads so that a gap is formed between said supporting member and said piezoelectric
resonator element.
8. (Five Times Amended) A method for manufacturing a piezoelectric resonator,
comprising:

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attaching a piezoelectric resonator element comprising a piezoelectric body having ~~an electrode disposed~~ electrode formed thereon, to a plurality of leads which connect said piezoelectric resonator element mechanically to a supporting member and permit electrical connection thereof;

providing a gap between said supporting member and said piezoelectric resonator element; and

forming a connecting layer of a conductive resin between ~~an~~ said electrode and a flat leading end portions of each of said leads, each said flat leading end portion being connected substantially in parallel with said electrode, and having a substantially U-shaped edge which opens toward a leading end thereof of the leads, ~~said electrode opposing one surface of said piezoelectric resonator element,~~

said piezoelectric resonator element being attached to ~~said leads at an end of the leading end portion on a portion of the substantially U-shaped edge closest to said piezoelectric resonator element,~~ on a side of said piezoelectric resonator element which faces ~~said supporting member leads,~~ so that an edge of said piezoelectric resonator element on the side which faces ~~said supporting member leads~~ may be positioned on ~~said portion of the substantially U-shaped edge.~~

14. (Five Times Amended) A piezoelectric resonator unit having a piezoelectric resonator, and a hollow protector, the piezoelectric resonator comprising:

a piezoelectric resonator element having a piezoelectric body and ~~an electrode disposed~~ electrode formed on a surface of the piezoelectric body;

a supporting member supporting said piezoelectric resonator element; and

a plurality of leads mechanically connecting said piezoelectric resonator element to said supporting member and permitting electrical connection thereof each of said leads being provided with a flat leading end portion having a substantially U-shaped edge

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which opens toward a leading end ~~thereof of the leads~~, each said flat leading end portion being connected substantially in parallel with ~~an~~said electrode, ~~said electrode opposing one surface of said piezoelectric resonator element, and using a connecting layer being formed with a~~ conductive resin between the flat leading end portion and said electrode, and

said piezoelectric resonator element being supported by said leads so that a gap is formed between said supporting member and said piezoelectric resonator element,

said piezoelectric resonator being ~~disposed within~~inserted, and sealed by said supporting member and said protector, and said piezoelectric resonator being attached to said leads ~~at an end of the leading end portion on a portion of the substantially U-shaped edge closest to said piezoelectric resonator element,~~ on a side of the piezoelectric resonator element which faces said ~~lead~~supporting member, so that an edge of said piezoelectric resonator element on the side which faces said ~~lead~~supporting member may be positioned on ~~said portion of the substantially U-shaped edge.~~

21. (Four Times Amended) A method for manufacturing a piezoelectric resonator unit comprising:

attaching a piezoelectric resonator element comprising a piezoelectric body having ~~an~~electrodes disposed~~electrode formed~~ thereon, to a plurality of leads which connect said piezoelectric resonator element mechanically to a supporting member and permit electrical connection thereof;

providing a gap between said supporting member and said piezoelectric resonator element;

forming a connecting layer of a conductive resin between ~~an~~said electrode and a flat leading end portions of said leads, each said flat leading end portion being connected substantially in parallel with said electrode, having a substantially U-shaped edge which

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opens toward a leading end ~~thereof~~ of the leads, ~~said electrode opposing one surface of said piezoelectric resonator element;~~

inserting the piezoelectric resonator element connected to said supporting member into a hollow protector; and

sealing the piezoelectric resonator ~~within~~by said supporting member and said protector,

said piezoelectric resonator element being attached to ~~said leads to an end of the leading end portion on a portion of the substantially U-shaped edge closest to said piezoelectric resonator element,~~ on a side facing said ~~lead~~supporting member, so that an edge of said piezoelectric resonator element on the side facing said ~~lead~~supporting member may be positioned on ~~said portion of the substantially U-shaped edge.~~